SUPPORT FOR THE AMENDMENTS

Claims 1-5, 7 and 8 are amended to use wording and structure consistent with U.S. patent law practice.

Claims 3, 4 and 8 are amended to eliminate multiple dependencies.

Claims 9-14 are new and are supported by original claims 3(9), 4(10 and 11) and 5(12 and 13.

No new matter will be added to this application by entry of this amendment.

Upon entry of this amendment, Claims 1-14 are active.

REMARKS/ARGUMENTS

The claimed invention is directed to a method for free radical polymerization of monomer molecules which is advantageous in comparison to conventional methods. Problems associated with free radical polymerization includes generation of heat which is difficult to control and leads to polymeric product having a wide range of molecular weights as indicated by the ratio of weighted average molecular weight to number average molecular weight (M_w/M_n). In order to avoid this problem conventional radical polymerization methods are conducted under mild reaction conditions to remove heat. However, improvement in the efficiency of these methods is sought.

Applicants have addressed this problem by providing a method for producing a radical polymer, comprising feeding a radical polymerization initiator and a radical-polymerizable monomer into a reaction tube having an inner diameter of 2 mm or less and performing polymerization in the reaction tube in a homogeneous liquid state under flow conditions. In addition, Applicants have provided a microreactor comprising a jacket for allowing a temperature-regulating fluid to pass therethrough, and a plurality of round tubes which are arranged in parallel in the jacket, each having have an inner diameter of 2 mm or

less, wherein reaction temperature in the round tubes can be regulated through controlling flow of the temperature-regulating fluid in the jacket. No such method or microreactor is disclosed or suggested in the cited references.

The rejection of Claims 1-3 under 35 U.S.C. 103(a) over Pysall et al. (U.S. 6,555,629) is respectfully traversed. Pysall does not disclose or suggest a method for producing a radical polymer, comprising feeding a radical polymerization initiator and a radical-polymerizable monomer into **a reaction tube having an inner diameter of 2 mm or less** and performing polymerization in the reaction tube in a homogeneous liquid state under flow conditions.

Pysall is directed to a process for the continuous preparation of polymers by free radical polymerization wherein the monomer and initiator are preheated, then conducted through a micromixer prior to entering a tube reactor. The tube reactor has a nominal diameter of 10 or 20 mm and the reference states:

> "The nominal diameters of the tubes of the tube reactor 20 can be chosen freely and **are determined by the desired throughput of solution polymers**." (Col. 5, lines 19-22)(Bold added)

The Office has alleged that the diameter of the tube as described in the presently claimed invention of 2 mm or less is a result-effective parameter affecting throughput of the solution polymers. According to the Office's line of reasoning, increasing the diameter of the tube would increase the volume of the polymer solution throughput and volume of throughput is therefore the recognized result of the variable diameter of the reaction tube.

In contrast, Applicants have discussed that in the method of the claimed invention, throughput is increased by increasing the number of microchannels while maintaining the dimensions of the microchannels unchanged (Page 2, lines 15-17). Moreover, Applicants have described beginning in the last paragraph at the bottom of page 7 and bridging to page 8, the effect of microchannel diameter upon control of the molecular weight distribution profile.

> "The present invention provides a method for effectively producing, within a short period of time, a radical polymer having controlled molecular weight distribution or a narrow molecular weight distribution profile, the method including polymerizing a radical-polymerizable monomer under flow conditions by means of a reaction microtube having an inner diameter of 2 mm or less and controlling polymerization temperature to a predetermined value."

Applicants respectfully submit that Pysall does not disclose or suggest that the molecular weight distribution (M_w/M_n) is dependent upon reaction tube diameter and therefore control of the diameter as in the claimed invention would not be recognized by one of ordinary skill in the art as a result effective variable related to molecular weight distribution.

Moreover, Applicants have demonstrated in the Examples significant improvement in polymer molecular weight control as determined by the M_w/M_n value. Tables 1-4 in the specification all demonstrate significant decrease in the M_w/M_n value for polymer produced according to the method of the claimed invention. Table 1 is reproduced below for the Examiner's convenience in consideration of this discussion.

Table 1

	Reaction mode	Reaction time (min)	Yield (%)	No. av. mol. wt. (Mn)	Mol. wt. distribu-tion (Mw/Mn)
Ex. 1	Tube (ID: 0.5 mm)	0.49	6.8	8.6×10^3	1.84
Ex. 2		0.98	12.4	8.6×10^3	1.8
Ex. 3		2	25.9	8.4×10^3	1.82
Ex. 4		4.8	48.5	8.5×10^3	1.83
Ex. 5		10.1	76	9.1×10^3	1.84
Ex. 6		11.5	84.8	9.5×10^3	1.84
Comp. Ex. 1	Batch	3	6.6	18×10^4	2.51
Comp. Ex. 2		5	20.6	1.3×10^4	2.21
Comp. Ex. 3		7.5	49.7	7.8×10^3	2.26
Comp. Ex. 4		10	68	7.0×10^3	2.26
Comp. Ex. 5		15	76.7	7.4×10^3	2.14

In Table I Ex.'s 1-6 were prepared according to the method of the claimed invention, while the Comp. Ex.'s were prepared in a batch reactor of larger diameter. The numbers indicate that at least a 14% reduction of M_w/M_n is obtained with the method of the claimed invention. Applicants note that in both the invention examples and the comparative examples, a single peak in the molecular weight distribution profile was obtained.

Therefore, Applicants have demonstrated that the cited reference does not recognize reaction tube diameter as a result-effective variable for control of molecular weight distribution. Likewise, the reference does not disclose or suggest the significant improvement in molecular weight distribution profile demonstrated by the claimed invention. Withdrawal of the rejection of Claims 1-3 under 35 U.S.C. 103(a) over Pysall et al. (U.S. 6,555,629) is respectfully requested.

The rejection of Claim 6 under 35 U.S.C. 102(b) and Claim 8 under 35 U.S.C. 103(b) over Fouillet et al. (U.S. 2003/0082081) is respectfully traversed.

The cited reference neither discloses nor suggests the inventions as described in Claims 6 and 8 of the present invention.

Fouillet is directed to a microfluidic device for parallel and synchronized injecting of series of mobile reaction chambers with non-miscible segmenters in micro-channels comprising injection means for forming alternate mobile reaction chambers and segmenters and means for controlling the progression of one of the two through the microchannel. (Claim 1; Abstract) The controlling means of progression through the reaction chambers is described as individual zones occupying specific **small portions of the reaction tubule** (Figs. 2A-2F).

In contrast, in the microreactor of the claimed invention as described in Claim 6 and Fig. 1, the jacket through which temperature-regulating fluid flows covers the entire length of round tubule not a small portion.

Applicants respectfully submit that a proper finding of anticipation requires that "[e]very element of the claimed invention ... be literally present, arranged as in the claim. *Perkin-Elmer Corp.*, 732 F.2d at 894, 221 USPQ at 673; *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771-72, 218 USPQ 781, 789 (Fed. Cir. 1983), *cert. denied*, 465 U.S. 1026 [224 USPQ 520] (1984). The identical invention must be described in as complete detail in the reference as is described in the claimed invention.

The cited reference clearly does not describe in detail the jacket arrangement of the invention according to Claim 6 and Fig. 1. Therefore, Applicants respectfully submit that Fouillet cannot anticipate the claimed invention. Moreover, as the method of Fouillet requires treatment control of very small individual bands in the tubules, this reference does not suggest complete coverage of the microtubule as in the claimed invention. As Fouillet

neither anticipates nor renders obvious the invention described in Claim 6, withdrawal of the rejection of Claim 6 under 35 U.S.C. 102(b) over Fouillet et al. is respectfully requested.

As Claim 8 directly depends from Claim 6 and Fouillet cannot cure its own deficiency as described above, withdrawal of the rejection of Claim 8 under 35 U.S.C. 103(b) over Fouillet is respectfully requested.

The objection to Claims 4 and 5 under 37 C.F.R. 1.75(c) is obviated by appropriate amendment. The claims are herein amended to eliminate multiple dependencies. Withdrawal of the objection to Claims 4 and 5 under 37 C.F.R. 1.75(c) is respectfully requested.

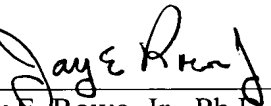
The objection to Claim 7 as being dependent on a rejected claim base is obviated by the previous arguments in support of the patentability of Claim 6. Claim 7 directly depends from Claim 6. Withdrawal of the objection to Claim 7 as being dependent on a rejected claim base is respectfully requested.

The objection to the Abstract is obviated by appropriate amendment. The Abstract is herein amended to be one paragraph in length. Withdrawal of the objection is therefore respectfully requested.

Applicants respectfully submit that the above-identified application is now in condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



Jay E. Rowe, Jr., Ph.D.
Registration No. 58,948

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)